CLAIMS:

1  1. A method of automatically determining the distance between a
2  first RF equipped device and a second RF equipped device
3  comprising:
4          establishing a radio link between said first RF equipped
5  device and said second RF equipped device;
6    in said first RF equipped device:
7          creating an acoustic waveform in the form of first
8          digital audio samples;
9          transmitting said first digital audio samples via said
10         radio link;
11         converting said first digital audio samples to an analog
12         audio waveform;
13         emitting said analog audio waveform as an acoustic signal
14         via a loudspeaker;
15    in said second RF equipped device:
16         receiving said first digital audio samples via said radio
17         link;
18         receiving said acoustic signal via a microphone;
19         converting said received acoustic signal to second
20         digital audio samples; and
21         determining the time difference between the arrival of
22         said first digital audio samples and said acoustic signal; and
23         determining the distance between said first RF equipped
24         device and said second RF equipped device based on the known
25         speed of propagation of radio waves, the known speed of sound,
26         and the time difference between the arrival of said first
27         digital audio samples and said acoustic signal.
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1  2.  The method of claim 1 further comprising comparing said first
2  digital audio samples against said second digital audio samples to
3  determine if they match, and if said first digital audio samples
4  match said second digital audio samples, then performing said

5  determining the time difference between the arrival of said first
6  digital audio samples and said acoustic signal.
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1  3.   The method of claim 1 wherein said radio link is Bluetooth™.
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1  4.   The method of claim 1 further comprising terminating an
2  exchange of further radio messages between said first and second RF
3  equipped devices if the distance determined is greater than a
4  threshold value.
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1  5.   The method of claim 1 further comprising terminating the
2  performance of a financial transaction if the distance determined
3  is greater than a threshold value.

6.  In an RF equipped device, a method of automatically determining
the distance between said RF equipped device and a second RF
equipped device, said second RF equipped device capable of emitting
an acoustic signal and transmitting a radio signal, said method
comprising:
        receiving first digital audio samples via a radio link;
        receiving an acoustic signal via a microphone;
        converting said received acoustic signal to second digital
9  audio samples; and
10       determining the time difference between the arrival of said
11 first digital audio samples and said acoustic signal; and
12       determining the distance from said second RF equipped device
13 based on the known speed of propagation of radio waves, the known
14 speed of sound, and the time difference between the arrival of said
15 first digital audio samples and said acoustic signal.
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1  7.   The method of claim 6 further comprising comparing said first
2  digital audio samples against said second digital audio samples to
3  determine if they match, and if said first digital audio samples

4  match said second digital audio samples, then performing said
5  determining the time difference between the arrival of said first
6  digital audio samples and said acoustic signal.

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1  8.   The method of claim 6 wherein said radio link is Bluetooth™.

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1  9.  An RF equipped device capable of automatically determining the
2  distance between itself and a second RF equipped device wherein
3  said second RF equipped device emits an acoustic signal and
4  transmits a corresponding radio signal, said RF equipped device
5  comprising:
6          an RF module that receives first digital audio samples via a
7  radio link;
8          a microphone that receives an acoustic signal;
9          a CODEC that converts said received acoustic signal to second
10 digital audio samples; and
11   a processor that:
12         determines the time difference between the arrival of said
13 first digital audio samples and said acoustic signal; and
14         determines the distance from said second RF equipped device
15 based on the known speed of propagation of radio waves, the known
16 speed of sound, and the time difference between the arrival of said
17 first digital audio samples and said acoustic signal.

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1  10.  The RF equipped device of claim 9 wherein said processor
2  further compares said first digital audio samples against said
3  second digital audio samples to determine if they match.

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1  11.  The RF equipped device of claim 9 wherein said radio link is
2  Bluetooth™.

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1  12.  In an RF equipped device, a computer program product that
2  automatically determines the distance between itself and a second

3   RF equipped device, said second RF equipped device capable of
4   emitting an acoustic signal and transmitting a radio signal, the
5   computer program product having a medium with a computer program
6   embodied thereon, the computer program product comprising:
7           computer program code for receiving first digital audio
8   samples via a radio link;
9           computer program code for receiving an acoustic signal via a
10  microphone;
11          computer program code for converting said received acoustic
12  signal to second digital audio samples; and
13          computer program code for determining the time difference
14  between the arrival of said first digital audio samples and said
15  acoustic signal; and
16          computer program code for determining the distance from said
17  second RF equipped device based on the known speed of propagation
18  of radio waves, the known speed of sound, and the time difference
19  between the arrival of said first digital audio samples and said
20  acoustic signal.

1   13.  The computer program product of claim 12 further comprising
2   computer program code for comparing said first digital audio
3   samples against said second digital audio samples to determine if
4   they match, and if said first digital audio samples match said
5   second digital audio samples, then determining the time difference
6   between the arrival of said first digital audio samples and said
7   acoustic signal.
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1   14.  The computer program product of claim 12 wherein said radio
2   link is Bluetooth™.
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